AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously presented). An isolated nucleic acid comprising a nucleotide sequence encoding a functional ND4 mitochondrial protein wherein said sequence comprises at least one codon substitution of a mitochondrial codon with a nuclear codon.

2. (Canceled).

3. (Previously presented). The isolated nucleic acid of claim 1, wherein the codon substitution is UGA to UGG.

4. (Previously presented). The isolated nucleic acid of claim 1, wherein the codon substitution is AGA or AGG to UAA, UAG, or UGA.

5. (Previously presented). The isolated nucleic acid of claim 1, wherein the codon substitution is AUA or AUU to AUG, CUG, or GUG.

6. (Previously presented). The isolated nucleic acid of claim 1, wherein all UGA codons are substituted with UGG codons; all AGA and AGG codons are substituted with UAA, UAG, or UGA codons; and all AUA and AUU codons are substituted with AUG, CUG, or GUG codons.

7. (Previously presented). The isolated nucleic acid of claim 1, wherein the nucleotide sequence comprises the sequence of SEQ ID NO:1.

8. (Previously presented). The isolated nucleic acid of claim 1, wherein the nucleic acid is comprised within an expression vector.

9. (Previously presented). The isolated nucleic acid of claim 8, wherein the expression vector is a plasmid.

10. (Previously presented). The isolated nucleic acid of claim 1, wherein the nucleic acid is comprised within an rAAV virion.

11. (Previously presented). The isolated nucleic acid of claim 1, wherein the non-naturally occurring nucleic acid further comprises a nucleotide sequence encoding a mitochondrial targeting sequence.

12. (Previously presented). The isolated nucleic acid of claim 1, wherein the nucleic acid further comprises a promoter operably linked to the nucleotide sequence.

13. (Previously presented). The isolated nucleic acid of claim 1, wherein the nucleic acid further comprises an enhancer element.

14. (Previously presented). The isolated nucleic acid of claim 1, wherein the non-naturally occurring nucleic acid further comprises a polyA tail.

15. (Previously presented). A cell into which has been introduced a nucleic acid comprising a nucleotide sequence encoding a functional ND4 mitochondrial protein wherein said sequence comprises at least one codon substitution of a mitochondrial codon with a nuclear codon.

16. (Original). The cell of claim 15, wherein the cell is a human cell.

17. (Original). The cell of claim 16, wherein the cell is a human nerve cell.

18. (Original). The cell of claim 17, wherein the human nerve cell is located in the optic nerve of a human subject.

19. (Withdrawn). A method for reducing dysfunction in a cell caused by a mtDNA mutation associated with Leber Hereditary Optic Neuropathy, the method comprising the steps of:

(a) providing a cell having a gene comprising the mtDNA mutation; and

(b) introducing into the cell a sufficient amount of a non-naturally occurring nucleic acid comprising (i) a nucleotide sequence that encodes a functional ND4 mitochondrial protein and that differs from a naturally occurring nucleic acid that encodes a ND4 mitochondrial protein by at least one codon substitution and (ii) a nucleotide sequence that encodes a mitochondrial targeting sequence.

20. (Withdrawn). The method of claim 19, wherein the non-naturally occurring nucleic acid further comprises a promoter operably linked to the nucleotide sequence that encodes a functional ND4 mitochondrial protein.

21. (Withdrawn). The method of claim 19, wherein the non-naturally occurring nucleic acid further comprises an enhancer element.

22. (Withdrawn). The method of claim 19, wherein the non-naturally occurring nucleic acid further comprises a polyA tail.

23. (Withdrawn). The method of claim 19, wherein the cell is a human cell.

24. (Withdrawn). The method of claim 23, wherein the cell is a human nerve cell.

25. (Withdrawn). The method of claim 24, wherein the human nerve cell is located in the optic nerve of a human subject.